mediate form. Mechanical force (shearing stress) and high tension electricity convert it directly into ordinary silver. Heat and chemical action convert it first into the intermediate form, then into ordinary silver. The action of light is to produce the intermediate form only, and even the most prolonged action at ordinary temperatures does not carry it beyond this. A remarkable parallelism appears to exist between the action of these forms of force on allotropic silver and their action on the silver haloids, indicating that it is not improbable that in these haloids silver may exist in the allotropic condition. Three coloured plates accompanying the paper illustrate the changes described.—The flora of the Great Falls coal-field, Montana, by J. S. Newberry.—High-level shores in the region of the Great Lakes, and their deformation, by J. W. Spencer.—On the composition of pollucite and its occurrence at Hebron, Maine, by G. H. L. Wells.—The volumetric composition of water, by Edward W. Morley. A description is given of the apparatus used to obtain results which will be published in the next number.—On the intensity of sound: a reply to a critic, by Charles K. Wead.—The fire-ball in Raphael's "Madonna di Foligno," by Prof. H. A. Newton. The fire-ball painted by Raphael in his picture, the "Madonna di Foligno," is most probably representative of one that fell at Crema in September 1511. Some political events of importance to Italy and the Pope, which transpired in 1512, were supposed to be connected with the fall of stones that occurred. It appears natural, therefore, that Raphael should introduce the Crema fire-ball into the altar-piece he was painting at the time.

Reale Istituto Lombardo, December 4, 1890.—Observations on the results of mechanical and chemical analyses of some soils in the neighbourhood of Pavia, by Prof. T. Taramelli.—The mean linear coefficient of expansion by heat, between the limits of temperature 0° and $t°$, of a homogeneous and isotropic solid body, is inversely proportional to the difference which exists between the temperature of fusion T and the temperature t, by Prof. A. Sayno.—On the dynamics of storms, by Prof. L. de Marchi.—On the classification of rational transformations of space, and in particular on transformations of the zero class, by Signor G. Loria.—Note on the calcite of some localities in the Grand-Duchy of Baden, by Prof. F. Sansoni.—On a theorem of differential geometry, by Prof. G. Padova.

December 18, 1890.—The coefficient of elastic expansion of a homogeneous and isotropic solid body at a temperature t, between two given limits, is inversely proportional to the difference which exists between the temperature of fusion T and the temperature t, by Prof. A. Sayno.—On some ancient and modern lavas from Stromboli, by Prof. G. Mercalli.—General formulæ for the representation of a field of force by means of elastic tension, by Dr. C. Somigliana.

January 15.—On the theory of the potential function of surfaces, by S. C. G. A. Maggi.—Results of observations made at the Royal Observatory at Brera during the years 1889-90.—On the diurnal variation in magnetic declination, by M. E. G. V. Schiaparelli. It is shown that the magnitude of the diurnal variation in magnetic declination is connected with the amount of spotted surface on the sun as exhibited by Wolf's relative numbers.—On calculations of condensation and on some applications of them, by E. Cesaro.

Notes from the Leyden Museum, vol. xii., No. 3, July 1890, contains:—P. C. T. Snellen, note on *Tyana superba*, Moore.—C. Ritsem, on *Cyriocrates zonator*, Thoms.—Ed. Lefevre, new Coleoptera belonging to the Eumolpidæ.—Dr. W. van Lidth de Jeude, on a large specimen of Orthragoriscus washed ashore at Ameland. The specimen is figured, and attention is called to discrepancies in the published descriptions and figures.—M. Schepman, on *Oliva semmelinki*, n.sp.—J. Büttikofer, zoological researches in Liberia; birds collected in the district of Grand Cape Mount. *Zosterops demeryi* and *Z. obsoleta* described as new, and eighty-six species enumerated.—W. Roelofs, *Ectatorhinus alatus*, n.sp., described.

No. 4, October 1890, contains:—J. D. Pasteur, on telegraph poles pierced by woodpeckers (*Picus analis*).—Dr. F. A. Jentink, on *Strepsiceros kudu* and *S. imberbis*, rectifies several mistakes made by various authorities about these species.—On two very rare, nearly forgotten, and often misunderstood Mammals from the Malayan Archipelago, *Pithecia melanurus*, S. Muller, the history of which species is quite a romance; but as facts it may be stated that it lives in Sumatra and West Java, that Duvaucel's drawing (reproduced in F. Cuvier's "Histoire naturelle des Mammifères") represents the animal of its natural size, that it has been accurately and satisfactorily drawn, and, finally, that the animal is a true mouse. Two specimens are in the Leyden Museum. *Tupaja dorsalis*, Schlegel. Dr. Jentink justifies Schlegel in keeping this as a species distinct from *T. tana*, contrary to the opinion he expressed in 1888.—On *Rhinoceros simus*, Burch. The Leyden Museum possesses a fine stuffed adult female, and an unstuffed skin of this species. Quotations are given from modern writings, which suggest that the species is not so rare as Dr. P. L. Sclater seemed to think (NATURE, vol. xlii. p. 520). The question is asked, Is the Quagga extinct? If so, it would be well to take stock of the existing specimens.—Dr. R. Horst, on *Perichæta vordermanni* and *P. sluiteri*, new species from the Island of Billiton.—W. Roelofs, on two new species of Poteriophorus, *P. van de polli*, and *P. sellatus*.—E. Candeze, *Melanoxanthus nigrosignatus*, n.sp., Java.—C. Ritsema, *Coloborhombus auricomus*, Java; *Thermonotus pasteuri*, Sumatra; and *Atossa bipartita*, Borneo, all described as new species.—Dr. de Jeude, on some reptiles from Nias.

Vol. xiii., No. 1, January 1891, contains:—Dr. J. G. de Man, carcinological studies in the Leyden Museum (plates i. to iv.). This is No. 5 of a series of studies. Several new species are described, a conspectus of fifteen Indo-Pacific species of the genus Gelasimus is given.—M. Schepman, *Fusus sieboldi*, n.sp., from Japan.—A. B. Meyer, *Cercopithecus wolfi*, n.sp., a beautiful species from Central West Africa, living in the Dresden Zoological Gardens.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 5.—"Some Points in the Structure and Development of Dentine." By J. Howard Mummery. Communicated by C. S. Tomes, F.R.S.

The purpose of the present paper is to show that there are appearances in dentine which suggest that it is formed by a connective tissue calcification, and that the process is more closely analogous to the formation of bone than has usually been supposed.

Processes or bundles of fibres are seen, incorporated on the one side with the dentine, and on the other with the connective tissue stroma of the pulp; some of the bundles give evidence of partial calcification, reminding one of similar appearances in the calcification of membrane bone. Cells are seen included in the bundles and lying parallel to their course; these cells, it is concluded, forming with the odontoblasts the formative cells of the dentine, the calcification of which should be looked upon as in part, at least, a secretion rather than a conversion process, the cells secreting a material which calcifies along the lines of and among the connective tissue fibres, the cells themselves not being converted into dentine matrix. These appearances are seen in the rapidly forming dentine of a growing tooth, as well as in more fully developed specimens. An examination of other Mammalian teeth reveals similar appearances. The dentine of the incisor of the rat (*Mus decumanus*) shows with great distinctness the incorporation of the connective tissue fibres with the dentine, and a marked striation of the dentine near the pulp cavity, parallel with these fibres. The ivory of the elephant's tusk shows the same relation of connective tissue to formed dentine. Vaso-dentine exhibits a very well defined connective tissue layer surrounding the pulp. This layer has hitherto been looked upon as consisting of odontoblasts, but this tissue shows no nuclei, and has the characters of a layer of flattened connective tissue fibres—a layer of nucleated cells in close apposition to the dentine, probably being the odontoblasts of vaso-dentine.

Physical Society, March 6.—Prof. W. E. Ayrton, F.R.S., President, in the chair.—Mr. James Swinburne read a note on Electrostatic wattmeters. After referring to the history of the electrometer method of measuring power developed by alternating currents, the author pointed out that the necessity for taking two readings from which to determine the watts might be obviated by having the quadrants separated instead of connected in pairs, as in the ordinary method. Non-inductive resistances are connected to the transformer, motor, or other apparatus in which the power is to be measured, so as to be in series with the apparatus, and on opposite sides of it, and the four ends of these two resistances are connected with the four quadrants. Under these circumstances the deflection of the needle is a measure of the watts. To increase the maximum deflection obtainable, so as to make an instrument capable of being read by a pointer, the needle is made in two halves, and fixed one below the other on the same stem, and, instead of quadrants, semicircular boxes are employed. In this way a range of about 130° is obtainable. Prof. Perry inquired as to what kind of *law* the instrument had, and Mr. Blakesley asked whether it was convenient to use. Mr. E. W. Smith pointed out that there was no necessity to take two observations in the ordinary electrometer method, for, by using a false zero, one deflection gave the watts. Further, the use of the false zero rendered it unnecessary to employ any other voltmeter when experimenting at constant pressure. The President said the historical part of the paper was not quite correct, and recalled attention to the fact that, when high pressures were used, a single reading obtained with the ordinary method of connecting up gave the power. For ordinary low voltages, however, the false zero method described by Mr. Smith was very convenient. Mr. Swinburne, in reply to Mr. Smith, said the observation of the false zero really meant another reading. As to the law of his wattmeter, referred to by Prof. Perry and the President, he said he never calculated a law, but calibrated the instruments directly.—Prof. S. P. Thompson now took the chair, and a paper on Interference with alternating currents, by Prof. W. E. Ayrton, F.R.S., and Dr. Sumpner, was read by the latter. The paper relates to the phenomena which occur when alternating electric pressures are impressed on circuits made up of various combinations of resistances, condensers, arcs, and inductive coils; to the characteristics of alternators; to the properties of transformers; and to the peculiarities exhibited by the Ferranti mains. In one of the experiments, an inductive coil and a condenser were connected in series, and a pressure of 25 volts, as measured by a Cardew voltmeter, impressed on its terminals; the pressures on the two parts, measured in the same way, were 110 and 104 volts respectively, thus showing that each of the two parts was much greater than the whole. On joining a condenser and inductive coil in parallel, an ammeter in the main circuit indicated 5·5 amperes, whilst those in the branches showed 6·4 amperes passing through the condenser, and 10 amperes through the coil. Other experiments of a similar nature were described, and it was pointed out that the ratio of the sum of the two parts to the measured total may be large, being about 8 in the case first mentioned. Theoretically this ratio might be anything, depending as it does on the phases of the pressures in the two parts, and these phases are determined by the ratio of the impedance of the coil to its resistance; practically, however, it was not easy to get a coil of large self-induction and very small resistance. Alternate current arcs and condensers gave results of the same general character as those above described, as also did arcs and inductive coils, such as the regulating coils of lamps; this may cause considerable error in estimating the power supplied to such lamps. The magnitude of the error was found to depend greatly on the quality of the carbons and the character of the arc. With bad carbons and a hissing arc the error was very great, but with good cored carbons burning steadily it was not very serious. Combinations of inductive and non-inductive coils exhibit marked peculiarities, particularly if the inductive one be a transformer coil. This last arrangement gave distinct evidence of interference, or difference of phase, when the secondary of the transformer was open, but when closed and with a moderate load, the difference of phase disappeared, thus showing that under these circumstances the primary coil had no appreciable self-induction. On the subject of alternator characteristics, a graphical method of drawing the E.M.F. curve from the terminal curve was described, and the dependence of the terminal curves on the character of the external circuit pointed out. Keeping the speed, exciting current, and armature current constant, the pressure between the terminals was shown to be dependent on whether the external circuit consisted of condensers, resistances, or inductive coils, the pressure being greatest in the former case, and least in the latter. The true E.M.F. of the dynamo, however, was the same in all the cases, but it became less as the armature current increased. From these results the authors conclude that the drop in E.M.F. with large currents is due to reaction on the field, but that the change of terminal-pressure cannot be all attributed to this cause. Transformers, it was shown, are powerful controllers of phase, for the primary and secondary currents are nearly always circulating in opposite senses; the phase-angle for a 1 to 1 Mordey transformer experimented on varying from 170° at no load, to 180° at full load. The relation between the strength of the primary and secondary currents A_p and A_s was found to be a linear one, of the form $\frac{P}{s} A_p = \alpha + \beta A_s$, where P and S are the numbers of turns in the primary and secondary respectively, and α and β constant, α representing the exciting current, and β being nearly unity. The phase-angle, ϕ, between the currents was given by the equation—

$$-\cos\phi = \frac{\frac{1+\beta^2}{2} A_s + \alpha\beta}{\beta A_s + \alpha}.$$

The results of numerous experiments on a transformer of the Mordey type, in which coils having different numbers of turns were put in parallel with each other, were given. In some cases resistances were put in circuit with the coils, and in others one or more of these resistances were cut out. Remarkable interference effects were thus produced, for in some combinations the volts or currents were additive, whilst in others they were nearly differential. In connection with the Ferranti effect, experiments had been made by putting a condenser on the terminals of the secondary of a transformer, and noting the resulting increases in pressure, both in the primary and secondary circuits. The results obtained with a given condenser and approximately constant secondary pressure show:—(1) That whether the transformation be up or down, the percentage rise in the secondary is greater than that in the primary. (2) That these percentage rises diminish as the secondary current increases. (3) That they increase with the ratio of transformation. (4) That the rise in the secondary may be considerable without that in the primary being appreciable. (5) That the rise in the secondary still persists even when large currents are flowing. These facts lead the authors to believe that the "Ferranti effect" is due to some kind of interaction between the cable condenser and the self-induction of the transformer, and that it is not only due to armature reactions in the dynamo. In the discussion on the paper, Mr. Swinburne said the character of the "Ferranti effect" had been wrongly stated, for he understood Prof. Ayrton to say that the pressure between the Ferranti mains was greater at the London end than at Deptford. This, he contended, was impossible. He also said the effects now described, of putting a condenser on the secondary of a transformer, and noticing the rise in both primary and secondary volts, were due to the waste field of the transformer. In large transformers, such as those at Deptford, the magnetic leakage was proportionately much less, and no such effects would be noticeable with them. Referring to the relation between the primary and secondary currents in transformers, he said it was convenient to look at the primary from two points of view, and consider one part of it as producing the magnetization, and the other as neutralizing the effect of the secondary current. Mr. Mordey described an experiment on armature reactions in alternators, in which one of the armature coils of a 50 h.p. machine was isolated from the rest and connected directly to a Cardew voltmeter. On varying the load from 0 to the full output (20 amperes), the voltmeter on the isolated coil was quite stationary, thus showing that no appreciable armature reaction occurred. Mr. E. W. Smith remarked that the formula connecting the primary and secondary currents holds true over a very wide range, for he had experimented on a Kapp transformer which gave α constant and $\beta = 1$ for frequencies varying from 20 to 200. Mr. Blakesley gave the following formula as applying to transformer currents generally,

$$\left(\frac{A_p}{A_s}\right)^2 = \frac{n^2}{m^2}\left\{(1 + kr_2^2) + \frac{qr^2}{v}\right\},$$

where r_2 = resistance of secondary, v is proportional to the frequency, m and n the primary and secondary turns, and k and q are constants depending on the disposition of the iron. This formula he found to very nearly represent Ferrari's results, and he hoped others would test its applicability to various types of transformers. He believed himself to be the first who carried out an interference experiment, when he put a condenser in parallel with an inductive coil six years ago. He mentioned the matter now, because that arrangement had been put forward by Mr. Glazebrook in explanation of the "Ferranti effect." Mr. Glazebrook, however, had made an error in stating that under certain conditions one of the currents may become infinite. Dr. Thompson thought the word interference had been used in a somewhat different sense from its ordinary usage in optics, and asked for an authoritative definition of its meaning in the paper under discussion. The experiments on the alternating arc he considered very remarkable, as well as those on the dynamo, which gives various terminal pressures when its E.M.F. and current were the same, but the external circuit of different character. Prof. Ayrton pointed out that the measurements on the rise of volts by putting on condensers, mentioned in the paper, were not strictly analogous to those made by Mr. Ferranti, for his were made by pilot transformers, one placed between the primary terminals of the Deptford transformer, and the other on the secondary of the London transformer; whereas in the cases now brought forward the volts measured were those at the primary and secondary of the same transformer. On the subject of arc lamps, he said that Messrs. Kolkhorst, Thornton, and Weekes, who made the experiments, found that great lag only occurred when the carbons were bad and the arc hissing. If the apparent and the true power spent in such an arc were measured, a great difference existed between them. Dr. Hopkinson, he said, had shown that this might be expected, if the arc had a constant back E.M.F. which changed sign with the direction of the current.—A paper on the theory of dissociation into ions and its consequences, by Prof. S. U. Pickering, F.R.S., and another on some points in electrolysis, by Mr. J. Swinburne, were postponed.

Entomological Society, March 4.—The Right Hon. Lord Walsingham, F.R.S., Vice-President, in the chair.—Mr. F. P. Pascoe exhibited, and made remarks on, a curious Coleopterous larva, with a case somewhat resembling that of the Lepidopterous genus *Psyche*, which was found at the Theatre of Bacchus, Athens.—Mr. J. W. Douglas sent for exhibition specimens of *Icerya ægyptiaca*, which, through the kindness of Mr. A. D. Michael, he had received from Alexandria on January 19 last. It was stated that in travelling most of them had become loose, and had lost their waxen appendages; but a few still remained on the stems of their food-plant. In connection with this subject Mr. G. H. Verrall alluded to a Dipterous parasite of *Icerya* from Adelaide—*Lestophonous iceryæ*, Williston—which had been bred from *Icerya purchasi*, last February.—Mr. R. Adkin exhibited a long and interesting series of *Triphæna comes* from various parts of the south of England, Yorkshire, Forres, the Isle of Man, the Isle of Lewis, and the north of Ireland.—Mr. G. F. Hampson exhibited a series of varieties of *Plotheia frontalis*, Walk., which was the only species in the genus, and confined to Ceylon. He said that the varied forms of this species had been described under twenty-one different names by Walker, Felder, and Moore.—Mr. F. Merrifield showed a number of specimens of *Selenia illustraria*, of three different stocks, proving that the spring brood of this species, which passed the winter in the pupal stage, was, like the summer pupa, materially affected in colouring by the temperature to which the pupa had been exposed in its later stages. He thought this fact, coupled with similar results ascertained with respect to the single-brooded *Ennomos autumnaria*, indicated that the operating cause was one of wide general application. Captain Elwes said that in his experience in many parts of the Palæarctic region, where there was a combination of heat and moisture, all the commoner species of Lepidoptera occurring in this country attained a larger size and a greater brilliancy of colouring than in colder and drier regions; and he referred to such species, amongst others, as *Pieris brassicæ* and *Argynnis paphia*. The discussion was continued by Mr. Jacoby, Mr. Fenn, and others.—Mr. W. H. B. Fletcher exhibited a long series of *Zygæna loniceræ* from York, and *Zygæna filipendulæ* from Shoreham, Sussex; also a series of hybrids obtained by crossing these two species. He stated that the eggs obtained from these hybrids were all infertile. Lord Walsingham said this latter fact was extremely interesting.—Mr. F. W. Frohawk exhibited a living specimen of an ichneumon which had just emerged from a chrysalis of *Papilio taunus*.—Mr. C. J. Gahan exhibited a number of species belonging to the genera *Lema* and *Diabrotica*, and read a paper on them, entitled "On mimetic resemblances between species of the Coleopterous genera *Lema* and *Diabrotica*." Lord Walsingham, Mr. Jacoby, Colonel Swinhoe, and Mr. Champion took part in the discussion which ensued.

Chemical Society, March 5.—Dr. W. J. Russell, F.R.S., President, in the chair.—The following papers were read:—Crystalline form of the calcium salt of optically active glyceric acid, by A. E. Tutton. This paper presents the results of a complete crystallographical investigation of the calcium salt, $Ca(C_3H_5O_4)_2, 2H_2O$, of the optically active (dextro-rotatory) form of glyceric acid described by Frankland and Frew. The crystals are monoclinic, and are hemihedral. The ratio of the axis is $a : b : c = 1{\cdot}4469 : 1 : 0{\cdot}6694$.—Fermentations induced by the *Pneumococcus* of Friedländer, by P. F. Frankland, A. Stanley, and W. Frew. Brieger has pointed out that this micro-organism is capable of fermenting suitable solutions of glucose and cane-sugar. The authors have confirmed Brieger's observations, and have found that the organism also ferments maltose, milk-sugar, raffinose, dextrin, and mannitol, but not dulcitol. The fermentations of glucose and mannitol were specially studied. The products are, in each case, ethyl alcohol, acetic acid, generally a little formic acid, and a trace of succinic acid, carbon dioxide, and hydrogen. The glucose is less readily attacked than mannitol and cane-sugar, and both are only partially fermented. Quantitative results of the products of fermentation are given. For mannitol, the several products are in very close accord with the molecular proportions—$9C_2H_6O : 4C_2H_4O_2 : 12CO_2 : 8H_2$.—The volumetric estimation of tellurium, Part 2, by B. Brauner. When a solution of tellurium dioxide in sulphuric acid is titrated with permanganate, the following interchange occurs:—

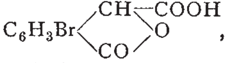
$$2KMnO_4 + 4H_2SO_4 + 4TeO_2 = K_2SO_4 + Mn_2(SO_4)_3 + 4H_2O + 4TeO_3.$$

The manganic salt is destroyed with decinormal ferrous sulphate or oxalic acid, and then permanganate is added in slight excess. The quantity of tellurium dioxide is calculated from the volume of permanganate used, *minus* that corresponding to the amount of ferrous salt or oxalic acid added, as if the following action had taken place:—

$$2KMnO_4 + 3H_2SO_4 + 5TeO_2 = K_2SO_4 + 2MnSO_4 + 3H_2O + 5TeO_3.$$

The result is greater by 1 per cent. than that calculated, owing to the evolution of some oxygen. In alkaline solution, the change which takes place is

$$2KMnO_4 + 3TeO_2 = K_2O + 2MnO_2 + 3TeO_3.$$

Excess of sulphuric acid is added, and oxalic acid used for retitration; the results are 0·35 per cent. too high.—Chloro- and bromo-derivatives of naphthol and naphthylamine, by H. E. Armstrong and E. C. Rossiter. The preparation of 1 : 4-dichloro-β-naphthol and 1 : 4 : 4′-trichloro-β-naphthol is described. The latter melts at 157°–158°; its acetyl derivative at 129°. 1-chloro-, 1 : 3- and 1 : 4-dichloro-, and 1 : 3 : 4- and 1 : 4 : 4′-trichloro-β-naphthol are all sulphonated with great ease, and yield derivatives of 1 : 3′- (Schaefer's) β-naphtholsulphonic acid. Whereas 3′ : 1-dibromo- and bromochloro-β-naphthol—in which the position occupied by the sulpho-group in Schaefer's acid is occupied by bromine—are sulphonated less readily. Bromochloro- and dibromo-β-naphthol yield, on oxidation, 1 : 3 : 4-bromophthalic acid; and the bromochloro-β-naphthol, when distilled with PCl_5, gives 1 : 2 : 3′-trichloronaphthalene as one of its products. The authors find that, contrary to Smith's statement, the preparation of tetrabromonapththol is attended with considerable difficulty. The product of the action of excess of bromine on β-naphthol consists chiefly of tribromonaphthol. Nearly all the chloro- and bromo-derivatives of β-naphthol yield quinone derivatives when submitted to the action of nitric acid. The final product of the action of nitric acid is a phthalic acid. Alkaline permanganate gives a series of oxidation products: for example, the main product of its action on dibromo-β-naphthol is the acid,  $C_6H_3Br\begin{cases} CH-COOH \\ \quad O \\ CO \end{cases}$, which, on distillation, yields bromophthalide.

Linnean Society, March 5.—Prof. Stewart, President, in the chair.—Mr. D. Morris exhibited a dwarf species of *Thrinax* which he found growing plentifully in the Island of Anguilla, West Indies, and which was apparently undescribed.—Mr. T. Christy exhibited the fruit of some undetermined species of plant which had been introduced into commerce by the name of Monchona, but the origin of which had not been ascertained.—Mr. J. E. Harting exhibited several instantaneous photographs (taken by Mr. W. H. St. Quintin in Yorkshire) of a living Great Bustard (*Otis tarda*), and gave a brief account of the recent visitation of several of these birds to England. Between December 9 and February 5 no fewer than seven had been shot, in Norfolk, Suffolk, Essex, Sussex, Hants, Wilts, and Carmarthenshire.—On behalf of Miss E. Barton, Dr. D. H. Scott gave the substance of a paper communicated by her, and entitled a morphological and systematic account of the fucaceous genus *Turbinaria.*—Mr. George Murray described some new species of *Caulerpa*, with observations on the position of the genus. In elucidation of this paper Mr. E. M. Holmes exhibited a large series of specimens, showing the extreme variability of the species of seaweeds which had been referred to this genus.—A paper was then read by Dr. John Lowe, on the specific identity of two forms of parasitic Crustacea, *Lerneonema spratta*, Sowerby, and *L. eucrasicholi*, Turton, the only two of the genus which had been hitherto recognized in Britain. A third species had been described by Dr. Salter (*Ann. Nat. Hist.*, 1850, p. 56), from the eye of the herring, and to this he gave the name of *L. Bairdii*, but his figures show clearly that they were drawn from imperfect specimens of *L. spratta*, which had been forcibly removed from the fish's eye, leaving the head behind. The parasites in question had only been found on the sprat, herring, and anchovy.

Royal Meteorological Society, March 18.—Dr. C. T. Williams, Vice-President, in the chair.—Mr. G. J. Symons, F.R.S., read a paper on the history of rain-gauges. It appears that Sir Christopher Wren, in 1663, designed not only the first rain-gauge, but also the first recording gauge, although the instrument was not constructed till 1670. The earliest known records of rainfall were made at the following places: Paris, 1668: Townley, in Lancashire, 1677; Zürich, 1708; and Londonderry, 1711. Mr. Symons gave a very full account of the various patterns of rain-gauges, and in most instances pointed out the merits or defects of each.—Mr. A. W. Clayden showed, on the screen, a number of interesting transparencies of photographs of clouds, lightning-flashes, and other meteorological phenomena.—The meeting was adjourned at 8.30 in order to allow the Fellows to inspect the exhibition of rain-gauges, evaporation-gauges, and new instruments, which had been arranged in the rooms of the Institution of Civil Engineers.

PARIS.

Academy of Sciences, March 16.—M. Duchartre in the chair.—Determination of the constant of aberration, by MM. Lœwy and Puiseux. (See Our Astronomical Column.)—On the equilibrium of fluid dielectrics in an electric field, by M. H. Poincaré.—On the different manifestations of phosphorescence of minerals under the influence of light and heat, by M. Henri Becquerel. The phosphoroscope contrived by the father of the author of this paper for the investigation of phosphorescence is well known. M. H. Becquerel has placed various specimens and varieties of fluor-spar in the phosphoroscope, and has observed the spectra they emit when illuminated by the electric spark or subjected to heat. A number of luminous bands are seen under either condition, and the wave-lengths of these have been determined. Chlorophane was one of the most interesting bodies examined. In rotating the disks of the phosphoroscope with increasing velocity, this substance emitted light of different tints, which tints corresponded to the appearance of bands of different refrangibilities in the emission spectrum. For a very slow movement of the disks the spectrum extended from about λ543 to λ478 with a maximum from about λ531 to λ497. On more rapid rotation, bands appeared at wave-lengths 557, 592, 606, and 492–478; afterwards, the velocity increasing, a band appeared at λ542, and this became more brilliant than any of the others, whilst the maximum at 531–497 was replaced by a band at 492–478. Similar variations were observed when chlorophane and other varieties of fluor-spar were subjected to changes of temperature. One of the conclusions deduced from the results obtained is that the different spectra given by the same body are due to the presence in the body of different substances which form definite compounds under certain conditions of illumination and temperature.—On a new method for the determination of critical temperatures and pressures, and in particular, the critical temperatures and pressures of water, by MM. L. Cailletet and E. Colardeau. The determination of the critical temperature of water is extremely difficult by ordinary methods, because the tubes of glass burst under the enormous pressures required. The authors have devised a method which permits the experiment to be made without observation of the disappearance of the terminal surface of the liquid. The method not only gives the critical temperature but also the critical pressure, and the curve of tensions of the saturated vapour of the liquid up to the critical point. The manometer used for the determinations of the high pressures necessary registers up to 400 atmospheres, and is installed in the Eiffel Tower. No results are as yet given.—On the fossils found at Gourbesville by M. de Lapparent, by M. Albert Gaudry. As a complementary note to a previous one, M. Gaudry states that he has discovered the teeth of *Palæotherium magnum*, *Mastodon angustidens*, *Carcharodon*, and others, in the Gourbesville conglomerate.—Effect of cold on marine fishes, by M. A. F. Marion. The author gives some observations made at Provence on the resistance of certain species of fish to severe cold.—On the application of M. Lie's groups, by M. L. Autonne.—Graphical method for the determination of the relative values of the force of gravity in different places, by M. Alphonse Berget. One of the arrangements proposed consists of a pendulum carrying a small lens which concentrates the light from a lamp upon a movable sensitized film. A continuous, sinuous curve is thus obtained; which may be compared with that given by a standard pendulum at Paris or some other centre.—On the degree of complexity of gaseous molecules, by M. Marcel Brillouin.—On the transformations which accompany the carburation of iron by diamond, by M. F. Osmond. Some experiments which are described show—(1) that diamond itself is not cemented by iron, but first undergoes, from contact with this metal, a molecular transformation which renders it capable of cementation; (2) that the diffusion of carbon in iron has for a corollary a diffusion of the iron in the transformed diamond.—On the formation of coloured lacs, by M. Léo Vignon.—Researches on the dispersion in organic compounds (ethers), by MM. P. Barbier and L. Roux.—On the ptomaines, by M. Œchsner de Coninck.—Influence exercised by the extractive matters on the alcohol in spirits, by M. Ch. Blarez.—On the toxicity of the soluble products of tuberculous cultures, by MM. J. Héricourt and Charles Richet. A healthy rabbit was not affected by an injection of two grammes of the lymph, but died when the dose was increased to three grammes. A rabbit suffering from tubercle, but otherwise healthy, was killed in forty-eight hours with a dose of about the eighth part of the latter. It would therefore appear that much care should be taken in administering Dr. Koch's lymph to patients.

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